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42nd Session of the WCRP Joint Scientific Committee

28th June – 2nd July

1. Highlights for the JSC

➢ Scientific Highlights

- The human imprint on the continental water cycle has now been documented in various ways. How it is linked to the impact of a changing climate on water potential remains open. The community needs to be encouraged to develop detection and attribution methods which allow to separate the human and climate drivers in the evolving water resources.
- GEWEX has initiated a group to encourage the community to add irrigation to land surface models. It will be a cross-cut between GHP and GLASS. The aim is to determine which are the geophysical drivers for irrigation needs and how well they can be determined within land surface models.
- The Evaporation cross-cut within GEWEX has made progress, especially through an on-line workshop in February 2021. One question where their contributions will be key is how much of total land evaporation is controlled by irrigation and other human activities.
- LIAISE field campaign is now underway. Deployment has started in April 2021 and the full set of instruments will be in the field from 15th to 31st of July 2021(https://hymex.fr/liaise/index.html). It will involve the deployment of multiple research aircraft and a GLAFO site. The scientific analysis of the data collected is being prepared.
- The ESA funded Irrigation+ project lead by Luca Brocca (CNR/Perugia) is progressing well (http://hydrology.irpi.cnr.it/projects/irrigation/). The objective is to evaluate the various methods available to estimate from remote sensing data the amount of water used for irrigation. Four main irrigation perimeters have been identified : Northern Germany, The LIAISE region, The Po Valley and a catchment in South Africa. One of the major open question is how to define the atmospheric water demand (potential evaporation) in way which is consistent between the various methods. The estimated actual evaporation fluxes also need to be evaluates.
- The km-scale modeling is continuing and the needed complexity for hydrological processes is emerging as a key question. How far do we need to represent hillslope processes when the atmosphere is at such high resolution that the assumption that local precipitation drives local evaporation is not valid anymore. The question of lateral water transports thus goes beyond the simple human intervention on the water cycle.

➢ Programmatic Highlights

1 Well established link with AgMIP community
2 Convection permitting modeling (CP) community well established and growing fast
3 Research programs funded in a number of European countries to understand the role of water usage on recent trends in water resources.
4 ESA has funded two research projects on quantifying irrigation using remote sensed information.

5 US agencies (NOAA, NSF, USDA) funded research projects to enhance the representation of agriculture management modelling for ESMs.

2. Primary science issues

- Water for the Food Baskets to become a GEWEX theme/focal point and is already anchored in our science plan (as the GC disappears)
- This is a very broad grand challenge which reaches well beyond disciplines within WCRP. It is thus an opportunity to strengthen our competences on the impact of climate change on water resources but also open doors to collaboration with other structures.
- We hope to involve all GEWEX panels in this activity and deal with the multidisciplinary aspects at the regional scale (i.e. the GHP strategy).

3. Advice from or questions to the JSC

- Irrigation is often seen by the WCRP community as a social or economic science issue. There are clear geophysical drivers in the irrigation problematic which we have a responsibility to tackle. Obviously the issue of when, where and how farmers decide to use water to facilitate the growth of their crops is beyond the scope of WCRP. Only once we have clearly identified the geophysical drivers (plants water stress and water availability) can we engage in a constructive collaboration with agronomical and economical sciences.
- Irrigation is also a problematic coupled to climate change and in this area WCRP has a stronger role to play. We need to provide to the practitioners of irrigation information on water availability at scales from seasonal to multi-decadal. WCRP has not yet engaged in this by it could be a target for the "My Climate Risk" LHA.
- Better linkage needed with the S2S community as this knowledge allows to refine irrigation strategies.
- Evaporation is a focus for GEWEX and we hope that by absorbing the GC we will be able to bring together a critical mass to make significant progress in the years to come.
- Developing joint activities with the AgMIP community/vegetation/crop modelling needs to be prioritized.
- The WCRP conference will be an ideal opportunity to bring together the main contributors to this Grand Challenge.
- A stronger integration with GEWEX panels will be helpful in order to involve more experts in either observations, land surface or atmospheric modelling.